

Dry Creek Bridge
Cook Road at Dry Creek
Ione Vicinity
Amador County
California

HAER No. CA-172

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Western Region
Department of the Interior
San Francisco, CA 94107

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HISTORIC AMERICAN ENGINEERING RECORD

DRY CREEK BRIDGE HAER No. CA-172

Location: Cook Road crossing of Dry Creek, Ione vicinity, Amador County, California.
UTM: 10-675554.4243762
Quad: Irish Hill, Calif. 7.5'

Date of Construction: 1895.

Engineer: San Francisco Bridge Company.

Present Owner: Amador County
Public Works Agency
10 Court Street
Jackson CA 95642-2336

Present Use: Highway bridge.

Significance: The Dry Creek Bridge on Cook Road is the oldest known unmodified metal truss bridge in California erected by the San Francisco Bridge Company. This Pratt through truss bridge was determined eligible for inclusion on the National Register of Historic Places under Criterion C at the local level of significance.

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I. DESCRIPTION

The Dry Creek Bridge on Cook Road is comprised of a single span, pin-connected 126-foot through Pratt truss, and one 18.5-foot timber stringer approach span at the west end, for an overall length of 146.4 feet; width is 17.9 feet between simple chain link railings. The truss offers 15.9 feet of vertical clearance over the deck. The substructure consists of a reinforced concrete abutment supporting the east end of the truss span, while a pair of lally columns--concrete-filled riveted steel cylinders three feet in diameter--support its west end. The structure has a one-lane wooden deck and wheel runners. The bridge spans Dry Creek at right angles, on an east-west alignment. The San Francisco Bridge Company fabricated and erected the truss in 1895.

II. HISTORICAL INFORMATION

Truss Bridge Development in California

The truss bridge--any bridge whose individual members are connected in a triangular pattern--dates to at least the 16th century, when Palladio depicted a truss bridge in his *Architecture*. For practical purposes, however, the metal truss bridge dates to the 1840s, when English and American designers invented and patented the truss forms which, originally executed in wood and iron, established the basis for later large-scale construction of metal truss bridges. These mid-19th century truss forms, particularly the Pratt and Warren trusses, facilitated the expansion of the American railroads in the later 19th century, and proved instrumental in highway construction in the late 19th and early 20th centuries.

Following its admission to the Union in 1850, California's maturity paralleled that of the American metal truss bridge industry. Indeed, one can find examples of all phases of metal truss bridge design--from the pioneering truss types of the 1840s to the bold long-span cantilevers of the 1920 to the movable truss spans of the early-to-mid-20th century--along California's highways.

In California, as elsewhere, railroad bridges were the chief representatives of 19th century truss bridges. California counties built few bridges before 1880, and it required the coming of the automobile age in the early years of this century before public agencies constructed substantial numbers of highway bridges. Thus extant 19th century highway truss bridges in California take the same structural form as their railroad counterparts of the period [and a number are former railroad bridges adaptively reused]. A number of California firms fabricated and erected truss bridges during the 19th century.

A number of factors influenced truss bridges in the 20th century. The organization of the American Bridge Company as a subsidiary of U.S. Steel saw the creation of a national firm capable of overwhelming local bridge companies throughout the nation, including those in California. At the time of its formation in 1902, American Bridge controlled some fifty percent of the country's metal bridge fabrication capacity, and it soon dominated truss fabrication nationally.

After 1900, county surveyors--and later state bridge designers--played a more active role in bridge design. During the 19th century, bridge companies had commonly designed and built truss bridges. In the 20th century, public officials or their private engineering consultants designed most truss--and other--bridges.

Also after 1900, the truss bridge fell into disfavor for use in cities or in sensitive rural areas. The truss was anathema to City Beautiful advocates such as Charles Mulford Robinson. In 1909 Robinson advised the City of Los Angeles that its existing truss bridges were "...about as ugly as they can be. As these are replaced, handsome structures should be substituted." The resulting "handsome" bridge was almost always of reinforced concrete construction, usually with architectural embellishment.

These three trends then, coupled with a substantial increase in the number of bridges being built, brought about changes in California's truss bridges. After 1900 the typical truss bridge was designed by a county surveyor to standard American Bridge Company specifications, and was located at a major crossing in a rural area. Further, truss bridges accounted for a decreasing proportion of the total number of bridges being built, and by the 1930s was little-used for small to moderate length crossings.

The Dry Creek Bridge

Cook Road apparently takes its name from William Cook or his descendants. The road is part of the remains of a wagon road network of far greater importance to the local area during the 19th century than today. Cook was an early settler of the area who established "Cook's Store" in Lancha Plana. Cook's Store--the same building--today stands in Buena Vista, just south of State Route 88 from the vicinity of the existing Cook Road. The site of Lancha Plana is today covered by the waters of Camanche Reservoir, but the store building was saved from that fate by the fortuitous offer of Chinese miners to move the store to allow mining on its original site, an offer that took place long before Camanche Reservoir was even contemplated.

The existing Dry Creek Bridge is the second bridge crossing at this site. The first was a privately-constructed wooden structure of unknown design, and was known as the Cecil Bridge. The records of the Amador County Board of Supervisors indicate that the Board authorized advertisement for bids for a replacement for the Cecil Bridge on August 5, 1895. They also placed a good number of similar advertisements for bridge construction throughout Amador County at this time.

In September 1895 the Board of Supervisors opened the bids submitted for construction of the Dry Creek Bridge. Darby Layden & Company submitted a bid in the amount of \$4,497.00, including 30 cubic yards of fill. B. McMahon bid \$8,775.00. Cotton Brothers and Company of Oakland (who built a number of bridges in Nevada County that have subsequently been determined eligible for the National Register) bid \$5,085.00, while J.A. Mahon bid in the amount of \$4,875.00. San Francisco Bridge Company, the successful bidder, offered a 126-foot steel span on concrete-filled cylinder piers, as specified, for the sum of \$4,375.00. Interestingly, the company also offered the County a proposal for a 161-foot steel and iron trestle as a cheaper--

\$3,375.00--alternative for the crossing. The Board of Supervisors, however, chose to contract for the specified truss bridge.

There are no known records pertaining to the actual construction of the Dry Creek Bridge. All that can be said with certainty is that construction proceeded quickly for the Amador County Board of Supervisors met in special session on November 16, 1895, to accept the new Dry Creek Bridge. In addition, the Board minutes record that San Francisco Bridge Company had additional work in the county, as the Board also voted them payment for work on the Hughes Bridges crossing over the Cosumnes River.

The records of the Board of Supervisors are interesting in that they indicate that the Board entered into many bridge contracts at this time without the resources to pay for them. They apparently did so with full knowledge, because they voted to delay payments to bridge contractors on a seemingly routine basis. In the case of the Dry Creek Bridge, the November 16 vote to accept the bridge included the proviso that payment was authorized as soon as the county's Bridge Fund contained sufficient funds to meet that demand. At the same time, they directed payment of \$1,800--half the contracted amount--for the Hughes Bridge on the Cosumnes River, with the balance to be paid when funds became available.

State engineers first inspected the Dry Creek Bridge in 1960, finding it virtually unmodified since its erection. Rust covered the steel of the truss and lally columns, but had caused negligible deterioration. Settlement of the north lally column had led to a slight upstream tilt of the bridge. While the inspector found the bridge in fair condition, he recommended it be posted for a load limit of four tons per vehicle, based on a stress analysis of the upper chord.

Two years later, Amador County requested a special inspection by the State, since they desired to increase the load limit. The existing four-ton limit caused a problem, in that it was just under the minimum required to allow a small school bus of 4-1/2 tons to legally cross the bridge to serve ranches to the west. With the four-ton limit in place, the bus had to stop at the east end of the bridge to discharge the students who then had to walk the remaining mile home. The County also informed the State inspector that they ultimately desired to raise the bridge's capacity to 20 tons to allow its use by farm trucks. The low load limit of the bridge forced these heavier trucks to use a gravel fill road and corrugated metal pipe culvert to cross the creek several hundred feet upstream from the bridge, and the road became impassable in winter when the pipe culvert had to be removed to allow high water flows. The inspector recommended that if the County imposed a speed posting on the bridge to limit impact stresses from live loads, then the load limit could be increased to five tons.

The regular inspection a year later in 1963 found the four-ton load limit posting still in place. This was due to the fact that the school officials, following the 1962 inspection, had insisted on the use of a larger, 12-ton school bus; the County then decided to forego raising the load limit to five tons. The County had placed supplemental supports under eight of the ten lines of floor stringers at the east abutment. The supports consisted of two-foot-long 6x12 untreated Douglas fir blocks resting on a new 12x12 untreated Douglas fir cap, in turn supported at its ends by the double I-beam fixed end bearings of the truss, and by a five-foot, eight-inch long 12x12 untreated Douglas fir post at the center of the cap. The inspector reviewed his

earlier calculations, and repeated his recommendation regarding raising the load limit to five tons.

Five years passed before the next inspection in 1968. This one revealed that, despite the 1960 order to post the bridge for a four-ton load limit, the County had now posted it for "Vehicles Over 5 Tons Gross Prohibited." The inspector found most of the timber floor stringers exhibiting decay, though the deck remained in fair condition. He also recommended re-posting the bridge for a four-ton limit.

By the time of the next inspection in 1976, Amador County had replaced the timber deck and floor stringers in-kind. They had also strengthened the original truss floor beams by placing supplemental I-beams, supported by hanger rods and hinge pins, below them, and had strengthened the end posts and top chords of the truss by replacing the original riveted lattice soffit with a plate bolted in place to form a box structure. Based on the foregoing, the State's inspector recommended raising the load limit to 14 tons, with a speed limit of five miles per hour on the bridge.

New calculations in 1979 found that the strengthening in 1975 had transferred the controlling stresses in the bridge from the compression members to the tension members, and that the critical portion of the truss was now the deck, and that wheel guard spacing allowed uneven loading of the trusses. With this condition existing, the inspector recommended retention of the speed limit, but re-posting the bridge for a load limit of ten tons per vehicle, 13 tons per semi-trailer combination, and 15 tons per truck and full trailer. He noted that placement of the wheel guards closer to the centerline of the truss would allow higher limits. This recommendation was not followed, and inspection in 1981 found the 14-ton limit unchanged.

Sometime during the night of January 4, 1982, high water in Dry Creek undermined and overturned the concrete seat west abutment, leaving the short timber approach span supported on one end by the truss floor beam, and unsupported at its other end. The County placed a temporary timber span over the gap, resting the landward end on top of the approach road pavement, replacing it the following summer with a permanent span. State inspections over the following decade, through 1993, found the bridge virtually unchanged and needing only routine maintenance of the deck runners, and retained the speed and load limit postings.

San Francisco Bridge Company

John McMullen, who had been working in construction in San Francisco, founded the San Francisco Bridge Company in 1880, incorporating the firm three years later with himself as president, and M.J. McPhetres as vice-president. In 1885 they hired Herman Krusi, a Cornell graduate, as the company's chief engineer. Iowa State College graduate, George W. Katt joined the company in 1886, with one of his first jobs being the commission for the important, 348-foot three-hinge steel arch bridge over the Frazer River in British Columbia. By 1887 the San Francisco Bridge Company was the largest bridge company in California, and by 1893 had an office in New York. The firm built many structures all along the Pacific Coast.

McPhetres left his position--but not his interest--in the firm in 1888 to round the San Francisco Contracting Company, and Krusi moved up to the position of vice-president. In 1889 the San Francisco Bridge Company marked their entry into the field of dredging with the construction of a one and one-half mile-long tidal canal linking Oakland's harbor with San Leandro Bay. They followed this with similar work in Boston, and formed the Atlantic, Gulf and Pacific Company which mainly undertook dredging work and the building of dredgers. John McMullen sold his interests in the San Francisco Bridge Company and other companies to his associates in 1908, retaining the Atlantic, Gulf and Pacific Company as his sole interest. Katt, who had secured the Boston harbor commission that had led to the creation of the Atlantic, Gulf and Pacific Company, became its president and chief engineer. Under new ownership, the San Francisco Bridge Company continued its active business on the West Coast, gradually moving away from bridge building and into the construction of steel-framed buildings.

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IV. PROJECT INFORMATION

Amador County will construct a new bridge carrying Cook Road across Dry Creek. The existing bridge, a weight-restricted one-lane structure on a two-lane road, constitutes a serious bottleneck. It provides the only access for six farms and ranches along the 2.5-mile length of Cook Road west of the bridge. Landowners must utilize the bridge to transport farm products such as walnuts, hay, sugar beets, tomatoes, wheat, corn, and safflower; they also herd cattle across the bridge. Oversize farm implements such as tractors, harvesters, and discs cannot use the bridge, and must cross Dry Creek at an upstream ford passable only in dry weather. The bridge's restricted load capacity requires that farm products be broken down into single loads comprising a tractor and one trailer, and even these often exceed the load limit.

When, in 1981, a large fire burned down from the north, the California Division of Forestry was unable to cross the bridge with a large tanker truck. As a result, more

than 3,000 acres burned uncontrolled until the fire was stopped at Highway 88. Other emergency service vehicles must also use the bridge, and are also subject to its load and geometric restrictions.

The new bridge will be a two-span concrete box girder span on the same alignment as the existing bridge. With a length of 156 feet and a width of 28.67 feet, the new bridge will provide a 20-foot roadway and two shoulders of three-foot, three-inch width. Cook road will be closed during construction, and local traffic will be routed via a detour on adjacent private property.

The existing bridge, constructed in 1895 across Dry Creek, has provided access to Lone and other markets from outlying ranches for 100 years. Today, the existing bridge is structurally and geometrically deficient, and subject to damage during flood conditions. The narrow width of the bridge does not provide sufficient room for a pedestrian walkway. The county has recorded the existing bridge as partial mitigation for its removal, and will attempt to market the structure for reuse elsewhere.